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Landslide Disaster Preparedness For Residents in Nyarumkop Village Singkawang Timur

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ABSTRACT

The purpose of this activity is to educate the community to know the symptoms of landslides and increase community awareness early on and provide assistance to the community to identify layers of soil or rocks that have the potential to cause landslides around residential areas using geoelectric. To achieve this goal, landslide disaster preparedness counseling activities are carried out for residents of Nyarumkop Singkawang Timur Village. The number of participants of the activity as many as 20 heads of families. Counseling activities carried out include coordination with the East Singkawang Sub-District and local RT, material briefings, simulation of landslide disaster mitigation, identification of potential landslides, and follow-up activities. The results of this community pengabdian activities can be described as follows: The community has been aware of the symptoms of landslides and there is an increase in public awareness early on. The community has also known the layers of soil or rocks that have the potential to cause landslides around their residential areas, namely limestone layers with layers of the top of the field of derailment in the form of clay, clay sand, and sandstone that can store water content.

INTRODUCTION

Landslide disaster is one form of hydrometeorological disaster that always occurs in Indonesia throughout the year and resulting in property loss, damage area and cost lives. Tectonic conditions in Indonesia that form high morphology, faults, fragile volcanic rocks and geomorphological processes that take place very intensively supported by a wet tropical climate, thus causing the potential for landslides to be high.

Landslides are more commonly found in fields that are not horizontal and are influenced by gravitational components. Gravitational force and water seepage are the main causes of instability that occur on the slopes. Landslide disasters are often associated with the coming rainy season. Landslide disasters can occur due to the presence of derailed fields. The derailment field is a water-holding field (low

permeability), dense in nature that allows weathering soil to move on it (Sugito et al., 2010; Dona et al., 2015). This is accelerated by the degradation of land due to changes in land use that do not heed the function of land in the area.

Nyarumkop Singkawang Timur Village area is one of the housing located on the slopes of the hills. Housing conditions located on the slopes of the hills are suspected to be prone to landslides. Therefore, it is necessary to conduct landslide disaster preparedness counseling early for residents living in Nyarumkop Singkawang Timur Village as an effort to increase citizen awareness and minimize property and life losses due to a disaster event. This counseling activity was carried out to change the view of the community who considered that the disaster was destiny as if nothing could be done except just accept whatever happened, but the disaster can be managed to reduce the number of casualties that may occur.

The underlying problem of the implementation of this activity is the initial knowledge of the community about the symptoms of landslides and the level of public awareness is still relatively low and alat geoelectric used to identify layers of soil or rocks that have the potential to cause landslides around residential areas are available in limited quantities and not everyone is able to operate them.

By implementing community service activities is expected to landslide and increase community awareness early on, memberikan assistance to the community to identify layers of soil or rocks that have the potential to cause landslides around residential areas of residents by using geoelectric, masyarakat know the symptoms of landslides and there is increased public awareness early on and masyarakat know the layers of land or rocks that have the potential to cause landslides around their residential areas.

METHOD

A. Location and Time of Activity

The location of the activity was carried out in Nyarumkop Village, East Singkawang District, Singkawang City. The time of implementation of activities for one week from July 17, 2017 to July 22, 2017.

B. Activity Objectives

The target of this activity is residents who live in Nyarumkop Singkawang Timur Village and number 20 families. The number of participants is small due to limited time and implementing personnel activities.

C. Implementation of Activities

Training on the manufacture of lime water filtration media is carried out through the following stages:

1. Coordination with housing owners and local RT

Coordination with housing owners and local RT is necessary to obtain permits for the implementation of activities, data of citizens who are targeted for activities, as well as the necessary facilities and infrastructure at the time of activities.

2. Material briefing

Material briefing is more focused on knowledge around landslide disasters, symptoms of landslides, and disaster mitigation both before disasters, during disasters, and after disasters. The provision of this material is necessary so that the community gets initial knowledge about landslide disasters and is ready to follow the activities at the next stage.

3. Landslide mitigation simulation

Simulation of landslide disaster management is necessary to facilitate the community in understanding disaster mitigation materials through direct application in the field, so that the community is ready to face disasters when they occur. This simulation is carried out in three stages consisting of the initial stage before a disaster occurs, the stage when a disaster occurs, and the final stage after a disaster occurs.

4. Identify potential landslides

Identification of soil layers or rocks that have the potential to cause landslides is carried out using geoelectric resistivity methods with Schlumberger configuration. The result of identification in the form of contour of the structure of the rock layer is interpreted the resistivity value of the sub-surface rock layers based on the resistivity value of earth materials. The result of the interpretation is then taken a decision on the layers of soil or rocks that have the potential to cause landslides in residential areas around residents.

5. Follow-up activities

As a follow-up to the activities, participants who have participated in counseling activities are expected to communicate directly with relevant agencies that deal with natural disaster problems if they find the initial symptoms of landslides. This is done so that quickly carried out continuous anticipation measures so as not to cause fatalities and property losses in the future.

RESULTS AND DISCUSSIONS

The participants in this training activity numbered 20 families. The participants were very enthusiastic to join this activity. This is because they have never gotten material or counseling about disaster preparedness before. They actively ask about the early symptoms of landslides, when disaster mitigation simulations take place, and how to interpret data on the identification of soil layers or rocks that have the potential to cause landslides through geoelectric methods. During the training activities there were no obstacles which meant that there were only some participants who did not take the activity too seriously so when asked about the material participants admitted to forgetting and not knowing.

Based on the geological map of Singkawang city, especially at the research location in Nyarumkop Singkawang Timur Village it is estimated that the structure of rock layers at the research site including in the layers of volcanic breksi units of kaligetas formations that override the layers of clay rock units kerek formation. The unit of volcanic breksi kaligetas formation consists of volcanic breksi, lava flow, tuf, tufan sandstone and clay stones that have a thickness ranging from (50-200) m. While the clay stone unit of kerek formation consists of clay, napal, tufan sandstone, conglomerate, volcanic breksi and limestone that has a total thickness of more than 400 m (Thanden et al., 1996).

Geoelectric resistivity measurements are carried out on a 150 m track with a south-north trajectory where the southern part is lower than the north. Point 0 m is at an altitude of 160 m above sea level and the point of 150 m is at an altitude of 169 m above sea level. The result of topographic data processing through Res2Dinv software with iteration of 3 and error of 102.1%, obtained 2D contour of resistivity value varies between 1.15 Ω m to 939 Ω m as shown in Figure 1.

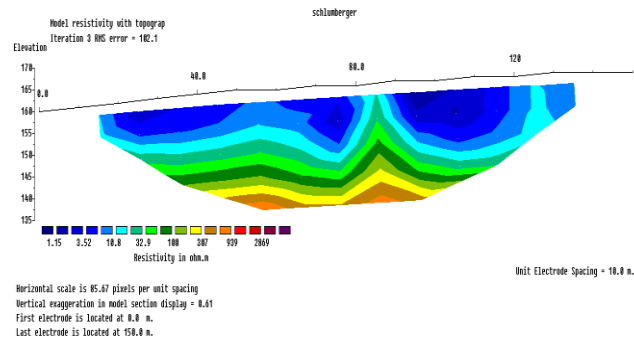


Figure 1. 2D image of sub-surface resistivity value with topography

Based on Figure 1, can be interpreted the layers of sub-surface rocks, among others, the first layer has a resistivity value (1.15-10.8) Ωm with dark blue to light blue color and is at a depth (2.50-13.5) m. This layer is adjusted to Table 2.1 and is estimated as clay stone. The second layer has a resistivity value (21.85-32.9) Ωm with a turquoise to light green color and is at a depth (13.5-19.9) m estimated as clay sand. The third layer has a resistivity value (66.45-203.5) Ωm with dark green to yellowish green color and is at a depth (19.9-26.9) m estimated as sandstone. The fourth layer has a resistivity value (307-939) Ωm with brown to orange color and is at a depth (19.9-26.9) m estimated as limestone.

The field of derailment obtained contrast resistivity between the two rocks adjacent to each other. If the resistivity above it is much lower, then it is very possible to landslide. Layers that have a lot of water content will have lower resistivity than layers that have less water content. This limestone layer is thought to be a derailment field on the track as shown in Figure 1 with a dotted line mark. The limestone layer has a much greater resistivity value compared to the other three layers. This indicates that the layer is a more waterproof layer compared to the three layers on it (Herlin & Budiman, 2012; Wakhidah et al., 2014).

The upper layers of the detected derailment field are thought to be weathered rock layers namely clay, consolidated shales, and sandstone that can store water content. If the rainfall is high, it is likely that water will accumulate in these layers resulting in landslides due to the movement of soil in those layers. Ground movement or slipping in the form of translation because the pattern of the field of flat-shaped or wavy ramps (Herlin & Budiman, 2012; Wakhidah et al., 2014).

Overall, this training activity has expanded people's knowledge about landslide disasters, landslide symptoms and ways to avoid landslide disasters early on. People have also been aware of layers of soil or rock that could potentially cause landslides around their residential areas.

CONCLUSION AND SUGGESTION

A. Conclusion

Based on the results of activities that have been done, it can be concluded several things as follows:

1. The community has been aware of the symptoms of landslides and there has been an increase in public awareness early on.
2. People know the layers of soil or rocks that have the potential to cause landslides around their residential areas, namely limestone layers with layers of tops of the field of derailment in the form of clay, clay sand, and sandstone that can store water content.

B. Suggestion

The expected suggestions of this activity are as follows:

1. Knowledge that has been gained by the community about landslide disasters can be transmitted to other residents to increase public awareness of natural disasters that can occur at any time, both landslides and other disasters.

2. Identification of soil layers that have the potential to cause landslides is limited to one trajectory due to time constraints. To get more accurate data, it is recommended to identify potential landslides can be done more than one trajectory.

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